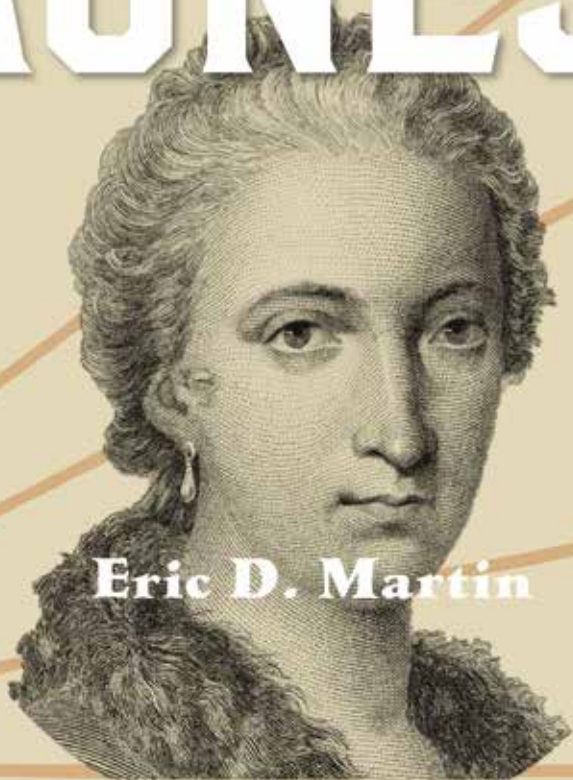


A NOVEL BASED ON THE LIFE OF
MARIA AGNESI

THE
WITCH
OF
AGNESI



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PROJECT

Widely regarded as a brilliant mathematician, Maria Gaetana Agnesi's great contribution to the field was her textbook, *Instituzioni analitiche ad uso della gioventù italiana* (*Analytical Institutions for the Use of Italian Youth*), published in 1748. This volume was received with great enthusiasm across Europe, and quickly became the gold standard for the instruction of calculus in all its forms.

Today, Maria is best remembered for the cubic plane curve that bears her name: "The Witch of Agnesi." Though her talents were remarkable and rarely encouraged among women in her day, Maria was a devout Christian and never accused of witchcraft. Instead, this curious name is the result of a mistranslation. Maria used an innocent-sounding nautical term, *versoria*, but at the time, witches were sometimes called the very similar-sounding *versiera*. Whether by mistake or intentional pun, English translations rendered it as the latter form, and so the name has stuck.

Prologue

MILAN, 1722

For three hundred years, the people of Milan had been building the same church.

Christos had sailed to all the shores of Europe, and even some of Asia, and nowhere had he seen another church so large. The Duomo's towers and spires and arching windows went up and up and higher still, half vanishing in the morning mist. It felt to him almost like the topmost steeple pointed straight to God Himself. Platforms and scaffolds enclosed the building's face, where masons labored fearlessly, never worried they might fall.

Six times Christos had come and gone from the city of Milan. The cathedral had changed, the scaffolding had shifted, but somehow it never seemed any closer to being done. How many people had passed away since someone first dreamed of building it, he wondered? How many people had struggled for something only their children's children might hope to enjoy?

He admired that about the Italians. They were never content with something good enough—they chased after perfection.

“Sir,” he called out from his market stall. “Sir, stop and look a moment!”

His was just one voice among many. Merchants from all over Italy and beyond pitched their stalls in the market square, offering everything Italian gold could buy. Most desirable of all were the clothes. Silk and linen, velvet and lace; the folk of Milan had wealth to spare and they dressed with cultured pride. Selling the right bolt of fabric could feed a family for a year. Some men had been known to beggar themselves for the perfect jacket. The locals quite literally wore their fortunes on their sleeves.

But Christos could not hope for such a sale. His fortunes had left him with nothing but vegetables. Life was like that sometimes. So there he was at the edge of the market square, hollering in a broken Italian that he had once thought very good, back home in Greece.

One man stopped and leaned on his hardwood cane before the stall. He had a long look at the goods on offer. As the moments passed, he furrowed his great and fearsome eyebrows.

“The finest produce, fresh from Tuscany,” Christos said, which was even true.

But the man didn’t seem to care. He shook his head and moved onward. Whatever he was looking for, it wasn’t in Christos’s stall.

That was when Christos first noticed the girl.

An odd person to notice, perhaps. A tiny child wouldn’t be much of a customer, let alone a child hiding behind her mother. But somehow she stood out—perhaps because she was trying so very hard not to. She walked with her shoulders hunched and

her eyes turned down, as if to make herself as small and insignificant as possible. Whenever another shopper pressed too close in the throng, the girl was quick to maneuver as far away as she could manage. Or at least as far away as she could get without leaving her mother's side. One hand clutched at the bright blue skirt of her mother's dress, her eyes staring hard at the flagstones underneath her feet.

A crack and a holler cut through the air, followed by a peal of childish laughter. The market crowd parted around a fast-rolling leather ball. Maybe half a dozen children went hurtling headlong after it, jostling and bumping each other in their determination to catch it first. It wasn't quite clear what game they were playing, or if it was even a game with rules at all.

Some girls might have joined in the fun. This one only buried her head against her mother's leg.

The mother was the image of a well-to-do Milanese woman: Hair pinned up, dressed just so in pleated layers, it was clear she was a woman of means. That she was here by herself doing her own shopping was a touch unusual, but hardly unheard of. Perhaps she wanted to personally scout material for a fine mantua dress.

No, that wasn't it, Christos suddenly realized. She was coming right to his stall. He immediately straightened himself and put on his best smile.

Before he could get out so much as a word, the Milanese woman spoke. Hers was a clear, clipped voice, and the words flowed out swiftly. "*Dieci carciofi, se vuole, buon signore. Quelli più freschi che hai, naturalmente.*"

Christos understood perhaps three of those words. Without realizing it, he lapsed into his native Greek. “Artichokes? You’re looking for artichokes?” He had them, of course. More than he knew what do with.

The only problem is that the woman didn’t understand so much as a word of Greek. Her thin-lipped mouth twisted off to one side, and she rapidly fired off a series of questions in Italian, so quickly that Christos could feel the limited vocabulary he possessed flying away from him. She held up her fingers, gesturing emphatically in the way Italians were uniquely fond of doing, but it didn’t help illuminate the mystery of her questions.

“No, no,” he insisted, holding up his hands. “Three coins each. I can’t go lower.”

They went back and forth a few times, but it felt like the more words they exchanged, the further away they got from understanding.

Finally, the Milanese woman let out a pointed sigh and looked down to the small girl at her side. Christos had altogether forgotten she was there.

What happened next nearly made him jump out of his skin. This young girl—she couldn’t have been more than five years old—looked up at him with mildly exasperated eyes. “My mother was wondering if perhaps you might be able to give her a small bargain on artichokes, since she wants to buy rather a lot of them.”

Not only was this very well-spoken for a little girl, but it was also the most perfect and fluent Greek that Christos had heard all week.

He stood there a moment, mutely opening and closing his mouth. "I . . . yes, let's call it a five *denari* discount," he eventually managed to say, reaching for the box in which he kept his coins. After quickly checking his ledger, he gave the combined cost. The girl cheerily repeated the figure back to her mother in Italian. Where on earth had she learned to speak Greek so well? The days when it was a universal language were long gone. These days, only scholars and travelers would be likely to study it.

The girl's mother started parceling out money from her purse. Christos duly began making change.

"Thank you very much, Mister Merchant, sir," said the little girl. Her eyes sparkled as she watched him scribble figures in his ledger. There was certainly no sign of her earlier shyness now. She watched the simple calculation with unusual intensity. Apparently, even though ball games did nothing to seize her interest, mathematics were an object of fascination.

Standing at the next stall over, an older woman wearing a broad-brimmed hat was watching all of this with a touch of amusement. She elbowed her gray-haired husband while tilting her chin toward the girl. "What a remarkable little woman," she called over. "How did she master a second language at such a young age?"

Christos was distracted by an insistent tugging at his wrist.

He looked down to find the little girl wearing a dreadfully serious expression. "You made a mistake," she told him, with the blunt honesty of which only children are capable.

"Nonsense," he assured her. "All your mother's change is here. I wouldn't cheat her."

Without waiting for his permission, she reached for his ledger, pulled it toward her, and started pointing. “No, not like *that*,” she said. “You’re giving us too much.”

“That’s very honest of you,” he told her, not wanting to believe her. This was his profession.

But now that he looked, he saw that she was right. He could feel the stares of the very small crowd that had gathered landing on him as he took back two diminutive silver coins.

“And you did it twice earlier today,” said the girl, already flipping back a few pages in his ledger. “You ought to be more careful.”

“*Grazie*,” he told the girl, after a very long pause. It was the only thing he could think to say.

The girl’s mother shook her head slowly, the same exasperated look in her eyes that Christos had seen on her daughter’s face just a little while ago. She reached down to ruffle her daughter’s hair, and then tugged her off into the ebb and flow of shoppers through the square. Soon enough, they were lost to sight, leaving Christos alone to frown over all the day’s calculations.

The girl’s name was Maria Gaetana Agnesi.

In time, the name would grow famous in all the world’s academies.

Chapter One

Maria had always been very good friends with numbers. Whenever she got home, they were there waiting for her, as reliable as her mother's smile. She bounded in, knowing all the sums without counting. Two stout doors, five tall windows, a townhouse with seven spacious rooms. Nineteen steps to the second floor, though that one was admittedly a little bit like cheating, since she always had to hop over the very last step to make the total come out right. Twenty just wasn't as beautiful as nineteen, and anyone who said otherwise simply hadn't examined the world closely enough. Prime numbers were the best numbers; that should be obvious to everybody.

A close second were the numbers divisible by three. When she thought hard enough about them, certain figures inevitably got tied up with colors in Maria's head. Threes were always very particular shades of green. She couldn't say why, but something about the crisp certainty of such things was comforting.

She supposed there must have been a time before she

thought about mathematics, but it was probably a more boring time, so she didn't much care to ponder.

The maid her father had hired a few weeks ago was busy puttering about with her feather duster, polishing all the vases and painting-frames and other things Maria wasn't allowed to touch, since apparently they were *worth a fortune*, one of her father's favorite phrases. Maria wasn't sure what exactly she was supposed to do with a fortune, which was apparently something grown-ups were always chasing after instead of more intriguing things like bugs.

"Hello, Maria," said the maid, whose name she hadn't bothered to remember. "It's me, Isabella, you remember?" Isabella used that high-up voice that grown-ups used when they thought you weren't very smart. Unfortunately, most grown-ups tended to think that way about every child they met.

Truthfully, Maria wasn't entirely sure she could trust the woman yet. "Did you go in my room?" She stood poised behind the edge of the sofa, half her face hidden. Safer, really, to not have to look at someone any more directly than you had to.

"Not yet," said Isabella, wiggling her duster in Maria's general direction. "Perhaps you'd like to handle it for me?"

Not the worst idea, really. Grown-ups' idea of mess was just Maria's idea of accessible.

Before she could answer, they were interrupted by a series of low-pitched *plonks*.

Maria dipped back behind the couch and darted away from Isabella into the music room, where her father kept his most

prized possessions of all. The centerpiece, of course, was the huge concert piano he was now struggling to play.

“Maria Gaetana Agnesi,” said her father, his sun-tanned face crinkling with the very slightest smile. His fingers walked along the length of the piano’s keys, drawing out a sound that was frankly only a poor imitation of music. He had only recently resolved to learn, but kept at it with the same dogged persistence he applied to everything else.

The look of concentration on his face might have appeared sour to someone else, but Maria knew better. It was subtle, but the smile was unmistakable. Probably he’d sold something. A good market day was the surest thing to bring up her father’s mood. Sure enough, the back of the piano was covered in great big bolts of cloth, some of them the kind of silk you couldn’t find anywhere in Italy. That silk formed the cornerstone of all her father’s make-a-fortune obsessions. To her, he was just Papà, but to the world he was Pietro Agnesi, and she knew people went mad for the fabrics he bought and sold.

He tapped a single key, *plink plink plink*, looking over at her from across the room. “Have you seen your mother?”

She shook her head rapidly. “Not since earlier.”

He shifted to another key, *plonk plonk plonk*. His eyes swept away from Maria back to the impenetrable details of the sheet music in front of him.

“Your mother was asking after you,” he said. “You should go see her.” Well, there was no arguing with him when he talked like that.

Nineteen steps and a hop later, Maria was upstairs. She knew exactly where her mother would be. It was the room they'd set aside for her younger brother—or younger sister. Apparently no one knew which one the baby was going to be. Nor would they, until the day it finally arrived. That seemed an awfully uncertain business to Maria, but she supposed it made things exciting, at least.

There was a cradle inside the room—empty, of course. Her mother sat beside it in a great big leather chair. Warm light filtered in through the windowpanes onto her fair, angular face. Her hands clutched a beaded crucifix with familiar ease. The closer they got to the day when her baby would be born, the more often her mother took to the rosary.

Fifty-nine beads on the rosary, which Maria imagined couldn't be an accident: God Himself surely also knew the beauty of prime numbers. After all, He'd designed them, hadn't He? That's what her mother was always saying. Ultimately, she insisted, every good thing in the world stemmed from God.

High on the wall above Maria's mother was a picture of the Virgin Mary. It wasn't as good as the French pictures her father collected downstairs. It looked simple, almost plain by comparison. At some point in its history somebody had taken a knife to it, and the scar was still there in the frame. Apparently it was something called an *icon* and had come out of the Greece she'd learned so much about in books. There was a simple honesty about it, even if it wasn't fancy all by itself.

After a quiet clack of bead against bead, Maria's mother startled and sat up straight, touching a hand to her chest. "Oh,"

she all but gasped, before laughing. “You snuck right up on me!”

“I didn’t sneak,” said Maria. “I’m still in the doorway.”

“How terribly cheeky of you,” said Anna Fortunato Brivio Agnesi—her mother’s long, full name.

“Papà said you wanted to see me?” Maria stepped into the room, wondering how different it would feel when her younger sibling finally arrived. She turned in a circle, measuring the place with her eyes.

Abruptly, Maria realized she was soaring right up into the air, lifted by the strength of her mother’s hands. Maria plopped down onto her lap with a little peal of laughter. Her mother’s stomach was getting bigger all the time, but there was still room for a tiny Maria, balanced on top of one leg and against a leather armrest.

“You’re very exuberant, you know, when you’re at home,” said her mother. “You could stand to show a little more of that side of yourself when we’re out and about.”

“I like it here,” Maria protested. “Outside is . . .” She didn’t have the word.

“*Chaotique*,” her mother suggested in French.

Maria shifted into French with practiced ease. For her it was no harder than just thinking about a math problem a little differently. “*Je ne suis pas sûr que ce soit le meilleur mot.*” She wasn’t entirely sure that “chaotic” was the very best word.

Somehow, her mother managed to sound both weary and proud at the same time. The noise she made was both sigh and pleased exhalation.

“Oh, Maria, what are we going to do with you? Your accent is even better than mine. How did you manage that? You learned all your French from me.”

And books, Maria might have pointed out, but books didn't have accents at all.

“Anyway,” said her mother, “I'm afraid you'll need to show a stiff upper lip because we're going out.”

Maria made a low noise that expressed all she intended to say on *that* subject.

“It's not the market, at least,” said her mother, delicately running her hands back through Maria's hair, making sure every strand was arranged just so. “We're going to the convent. Your mother has some very important work to do there, after all.”

Well, it was going to be a struggle, but Maria knew better than to complain. Without being asked, she hopped off her mother's lap.

For her mother, standing proved a trial. Anna had to brace herself with both hands on the armrests, struggling with all the extra weight with which pregnancy had burdened her. But when it was done, all she did was smile. “Come along, Maria.”

They got as far as the front door before being stopped. Her father looked up from the sitting room sofa, clearing his throat in that very particular way. “I thought we already had this argument,” he practically sighed, looking his wife straight in the eye.

“And I believe I made my position perfectly clear,” she replied.

Maria's father leaned forward, raising a single finger toward

the ceiling. “You’re almost six months’ expecting, Anna. You should be spending your time here, with your family. Leave Church business to Church people. The faith got along all right without you for seventeen hundred years; I daresay it can last a few additional weeks.”

“We’re all of us ‘Church people,’” she insisted. “Not just the clergy. We’re all of us one great big living church, and they need me there. No one else is going to teach those children their French.”

“Your duty is to *your* children,” he fired right back, his tone growing short. “Not the children of beggars. And you promised you’d cut back your hours.”

“I did, and I have.” Anna was a kind and giving woman, but once she’d drawn a line in the sand, it would take nothing less than a miracle to get her to yield. She put her hand on the doorknob to illustrate her resolve. “It’s just the class now. And they’ve got someone else lined up for next month.”

Pietro Agnesi let out a long, low grumble, reaching for the book discarded on the table in front of him. “Just this once,” he insisted, in the style of a man who knew defeat.

Maria’s mother’s face lightened up with bright, sparkling enthusiasm. “Come, come, Maria! I daresay you’ll love the convent. It might be my very favorite place.”

And then they were out in the streets, braving the pale mists of spring.

When the Santa Maria delle Grazie had first been built, Europe

knew only one Church, and Milan was ruled by an Italian family. The Sforza family, they were called, and they paid for all manner of art and buildings to beautify the city they ruled. Those were the days that would eventually be called “the Renaissance,” days of master painters and the most clever new inventions. Generations had gone by since. Foreigners had conquered the city back and forth between themselves in the intervening years, the French and the Spanish and the Austrians over the mountains.

Maria didn't quite know all the details—history never really interested her very much—but she knew beauty when she saw it. A great circular tower crowned the central church, but that wasn't where they were headed. Staying a safe, close distance just beside her mother, Maria walked across the stone courtyard into the shade of a tree-dotted square, where the buildings of a monastery and convent clustered close together.

“I'm going to need your help today,” said Anna Brivio, smiling down at her daughter from beneath the shade of her very finest hat.

It wasn't often that grown-ups asked *her* for help. This was a novelty that Maria at once found thrilling and slightly worrying. “With your class?”

“No, no,” said Anna, “The things I promised your father I wouldn't be doing. It's time you learned a bit about . . .” Her voice abruptly trailed off, her eyes widening in alarm. Her hand reached for the nearest surface. It turned out to be the sandy wall of the convent. She leaned against that wall a moment, panting.

Maria felt her heart start thudding in her chest. She looked around rapidly for someone who might help, but the noontime sun was bright and everyone seemed to be indoors. Words spilled frightfully from her mouth. "Are you all right?"

Anna laughed wearily, leaning back against the sand-colored stone wall. "Just fine," she insisted, though a bit of the color was gone from her cheeks. "The baby's a little heavier than I cared to admit. I think I'll be teaching my class sitting down."

With a creak of aging wood, a frowning, habit-draped nun emerged from the nearest door, preoccupied with some sort of clerical business. She stopped, however, upon seeing Maria and her mother lingering nearby.

For some reason, just like always, Maria felt the familiar tremor of fear in her stomach that appeared whenever she met a stranger. Her instinct was to hide behind her mother, but what was behind her mother was currently a solid stone wall, so it simply wasn't possible.

"Greetings, *signora*," said the nun, her voice a little creaky itself. Age had weathered shallow lines into her face. "As always, it's good to see you."

Though her mother had shown a moment of weakness a second ago, it was now nowhere to be seen. "Yes, Mother Angelica. Always a pleasure." Patting Maria reassuringly on the back, Anna marched the girl right inside.

Maria avoided eye contact with the nun, staring at the cracks on the sun-warmed ground until they were safely out of sight.

It took her eyes some time to adjust. The inside seemed dim

at first, the air noticeably more cool. A faint smell of incense lingered in the air like a dusting of spice. It was quiet there, though Maria could hear the distant clink and clatter of a working kitchen.

Somewhere, someone quietly droned the words of a lengthy prayer, muted by the walls between them.

It was a quiet and contemplative place. Maria liked the quiet. Turning a corner, she saw a great big rack of books, their spines marked in all manner of languages. She liked that even more. An ancient Dominican stood precariously atop a bookshelf ladder, reaching for something in what looked like Latin, a language Maria knew less well than she would have preferred.

She didn't realize she was about to walk into a wall until her mother stopped her.

"Maria," she laughed breathily, looking down at her. "You spend entirely too much time in your own head. You should mind what's right in front of you."

Maria might have said something clever about that, but the old Dominican squinted down at her, his eyeglasses making his pupils enormous. It was more than she could bear. Quickly looking away from his face, she nodded rapidly and clutched at her mother's skirt.

Eventually, they reached the kitchen. A great big pot of stew was simmering, filling the place with a savory aroma. A clerical novice and a pair of volunteers fussed over the stove and laid out a seemingly endless series of bowls.

Maria asked, "What's all this?"

“Food for the poor,” said Anna. “Not everyone is as lucky as we are.” She hoisted up the parcel she’d been carrying, which contained all the artichokes they’d bought the day before. “I want to do what I can for them with what we’ve been given.”

“That’ll go over well,” said the young novice, looking a touch displeased over the prospect of needing to cook even more food.

“Anyway, you’ll be helping out here,” Anna told her daughter, beaming her ever-ready smile.

“Help?” Maria rapidly blinked her eyes. “I don’t know how to cook.”

“And you won’t need to,” Anna assured her. “All you have to do is ladle out soup and take it to the people who need it.”

Very easy, perhaps, for anyone but Maria. A dreadful, worrying thought took hold of her heart as she looked at all those bowls. Each one of them represented a person. A person she hadn’t met before. Her mother had just asked her to do the very thing she found hardest in all the world: Go up to strangers. Heaps of them.

“It’ll be good for you,” said her mother, clearly believing she was doing Maria a favor.

It took a minute before Maria realized her mother had already gone off to teach her French class elsewhere in the convent’s halls. In fact, it took two whole minutes before Maria stopped staring at the nearest wall.

The people in the kitchen, at least, were extremely friendly. Easy for them, Maria thought sullenly. They hadn’t been asked to face their impending doom.



“Just one time,” said Mother Angelica, standing with crossed arms in front of Maria in the kitchen.

“I don’t wanna,” said Maria, wishing she didn’t sound like such a child, even though she was, in fact, a child.

“Christ carried his own cross up the hill of Calvary knowing he would be a sacrifice for all mankind,” said Angelica, which really didn’t help Maria feel any more at ease. “I think you can carry a soup bowl across a single room to help feed a hungry woman.”

“I don’t *wanna*,” Maria insisted, possessed of a new insight into Christ’s question about why his father had forsaken him. She clutched the bowl of soup they’d asked her to carry so tightly she was a little worried she might break it.

In the next room, the sound of conversation and spoons scraping bowls mixed into a din louder than the sum of its individual parts.

Mother Angelica let out a long, careful sigh. Sternness might have worked with her initiates, but it was getting her nowhere with Maria. She smoothed out her habit and knelt down in front of Maria, bringing them both to eye level. “We all have to do difficult things,” she told the girl. “And I can see this is very, very difficult for you. But I promised your mother you’d learn something about charity today. So I’m only asking you to go in the one time, for her. Do that, and I promise you’re done. All right?”

Maria thought about her mother, huffing and puffing and

struggling to do the work no one had even asked her to do, carrying the burden of a child who had not yet even been born. “All right,” she said finally, hating herself a moment for wanting to do the right thing. “But just once.”

With a nudge at her back from the old nun, she trudged into the room where the convent admitted the poor.

What she noticed first was the *smell* of the dining hall. No city smelled great, but the acrid smell of so many unwashed bodies overpowered even the perpetual scent of incense. Maria felt her nostrils flaring as she went inside.

And then there was the look of the folk seated along all those wooden benches. Threadbare clothes, sun-cooked skin, some of them slender with hunger. One woman in the back stared at her a little too long, the whites visible all the way around her eyes. There was something about the force of a stare, and that was the worst one Maria had seen all day.

So Maria swerved toward the nearest table, rapidly looking for someone who hadn't yet been served.

The most frightful-looking old woman she'd ever seen peered right back at her. Her nose was quite big, her mouth quite small. The wispy mess hanging from her crown looked more like a drooping bird nest than a proper head of hair. It was the sort of beggar she'd seen kneeling for alms by the roadside.

With trembling fingers, Maria put down the bowl in front of the old beggar. “H-h-here you are,” she managed to stammer out.

And then a very strange and unexpected thing happened. The beggar simply smiled at her, and everything was fine.

For a brief moment, there was nothing frightening about

her at all. Maria saw just an old, tired woman, someone who might have once raised children of her own.

“Thanks be to God,” said the beggar, her gnarled hands flattened together in a brief gesture of prayer.

Yet for some reason, Maria couldn’t escape the notion that she wasn’t thanking God—she was thanking *her*, in particular.

It might have been better if she had said something nice back. But instead, she just tore out of there as fast as her short legs would carry her, ignoring Mother Angelica and ignoring the kitchen staff and heading straight for the classroom where her mother taught French.

The students were all older than Maria, and none quite so desperate-looking as the hungry poor. Maria ignored every last one, moving to the desk in the very farthest back corner of the room.

She and her mother met eyes for only a moment—before the lesson continued, the same as always.

There was nothing new in the lesson. Maria had learned every last declension ages ago. But there was something about the regular, reliable shape of their forms that slowly calmed her heart, and she silently mouthed them along with everyone else.

That night, Maria’s parents had an argument.

They always waited until Maria was in bed. With a whole flight of stairs between them, they probably figured she couldn’t hear them. But she was both more awake and more clever than her father gave her credit for.

The subject was the same as always: her mother’s charitable

work. She was going to run herself ragged, her father insisted, but her mother only regretted not being able to do more. Couldn't she see that she was putting the baby at risk? Couldn't *he* see that God had a plan for her?

Eventually things grew quiet. Through the small gap of her partially opened door, Maria was just barely able to watch her mother come up the top of the stairs. She held aloft a single flickering candlestick, also clutching the great big stack of papers Maria knew she used to plan her lessons.

The light of the candle and the shadows it cast grew longer and ever more tenuous as Anna walked not to the master bedroom, but to her study at the end of hall. Inside, the chair and desk creaked to accept her weight.

She shut the door, but Maria could still see the light she carried. She watched it dimly dance, occluded by the intervening glass of both their darkened windows.

For all the timeless time before she fell asleep, Maria could still see the silent flickering of that candle.